Evaluate Various Representations of a Complex Software System

Goals and motivation for the assignment: The purpose of this assignment is to stimulate critical thinking about the value of various software representation approaches. The assignment asks you to use various representations as vehicles for specifying to different stakeholders one or more aspects of the complex system that you proposed in your last assignment. In doing this, you are being asked not only to specify aspects of the system, and why they are of interest to stakeholders that you identify, but also to comment on how well the various representations met the needs of the stakeholders, commenting especially on the ways in which they fell short. In fact the assignment is more about providing critical evaluation of the effectiveness of the representation approaches than about the specific representations that you produce. Creating more representations is unlikely to improve your grade on this assignment. Providing more carefully documented evaluations of the representations will improve your grade. Thus, the assignment is designed to both improve your sense of the utility of the different representation approaches, and sharpen your skills at evaluation of different software representations in general.

What is the assignment?:
In the previous assignment you provided a largely informal description of a complex software system of interest to you, identifying specific stakeholder groups and describing their interests in the software. In this assignment you will complement that informal description with formal specifications developed through the use of the software representation approaches presented in the lectures. You will use these representations to develop representations of the system that are intended to be effective vehicles for communicating to specified stakeholder groups information that you have previously identified as being of interest to them.

In particular, you must identify specific stakeholder groups identified in the last assignment. For each group you must then identify interest that they have in the system, and then use dataflow graphs (DFGs), Finite State Machines (FSMs), Message Sequence Charts (MSCs), or Petri Nets (PNs) to specify some aspect(s) of the system that is of interest to the stakeholder group.

As noted in lecture, there are many possible different kinds of DFGs, FSAs, MSCs, and PNs, and the different kinds have different semantics. Thus you must define the semantics of the different graphs that you will use in this assignment. Having defined the graph semantics, you must then use them in ways that are consistent with the stated semantics to develop graphs that specify important characteristics and features of your example system. Having done this, you must then indicate the strengths and weaknesses
of the different kinds of graphs that you have used. Indicate ways in which each graph helped you to create a specification that seems effective and appropriate for the selected stakeholder group, and ways in which the graphs were balky or inadequate.

For your completed assignment you must select some different graph types. You should select your graph types from the following choices—DFG, FSA, MSC, and PN. 520 students must select at least two different graph types, and 620 students must select at least three different graph types. For each graph type selected you must:

- Provide a definition of the semantics of the graph type.
- Create at least a few non-trivial graphs that are instances of the graph type that you have defined. Each graph instance should be developed for the purpose of specifying precisely and in detail some aspect(s) of your system that is of interest to some stakeholder group that you identify. It will be important for you to be sure that each graph instance is consistent with the semantics of the graph type that you have defined. Any demonstrations or explanations of this consistency will be useful.
- Write an analysis of the strengths and weaknesses of the graph type. This analysis should refer to specific details of your graphs to support the points that you make in this discussion.

You may use different graph types to specify different features or aspects of your system, or you may use different graph types to specify similar features or aspects.

FOR 520 STUDENTS:
- Select at least two different kinds of graphs from among DFG, FSM, MSC, and PN.
- The definitions of the semantics of your graph types must be precise. These definitions can be in natural language English, but care must be taken for the specification to be very precise and complete.

FOR EXTRA CREDIT: Use a mathematical notation such as Predicate Calculus (e.g. as was done in the class presentation materials) for your graph type semantic definitions.

Anticipated length: 8-12 pages

FOR 620 STUDENTS:
- Select at least three different kinds of graphs from among DFG, FSM, MSC, and PN.
- The specification of the semantics of your graph types must be in a mathematical notation such as Predicate Calculus (as was done in the class presentation materials).

Anticipated length: 10-20 pages